

ANUSHA J. PAI ASNODKAR

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RESEARCH INTERESTS

- Spectroscopic characterization of highly-irradiated giant exoplanets to empirically constrain atmospheric circulation and escape.
- Instrumentation for atmospheric characterization of directly-imaged exoplanets.

EDUCATION

The Ohio State University 08/19 — Present

Ph.D., Astronomy, Department of Astronomy. Expected graduation in 2025.

California Institute of Technology 09/15 — 06/19

B.S., Physics, Division of Physics, Math, and Astronomy.

RESEARCH

Optical testbed for a dual-aperture fiber nuller (GSPEC) 08/21 — Present

The Ohio State University, Department of Astronomy

Prof. Ji Wang

Developing an optical test bench of a dual-aperture fiber nuller design concept for applications in spectroscopy of directly imaged exoplanet systems.

Skills/Software: Optics, Python

Atmospheric characterization of ultra-hot Jupiters 08/19 — Present

The Ohio State University, Department of Astronomy

Prof. Ji Wang

Applying high-resolution transmission spectroscopy of ultra-hot Jupiters to detect atomic/ionized species as tracers of planetary and atmospheric dynamical properties. Publications in preparation.

Skills/Software: Python, MCMC, Gaussian Processes

Detector calibration and numerical modeling of critical phenomena 06/18—06/19

Jet Propulsion Laboratory, Division 382J

Dr. Inseob Hahn

Combined skills in optics and programming to extract CMOS image sensor pixel response functions and corrections to detector distortions by laser interferometry. Participated in secondary project implementing crossover parametric model of critical phenomena.

Skills/Software: Optics, electronics, Python, MATLAB, Mathematica, numerical methods

Design and construction of an extended cavity diode laser for spin initialization in rare-earth quantum memories 06/17—08/17

California Institute of Technology, APhMS Department

Prof. Andrei Faraon

Constructed and characterized a tunable extended cavity diode laser customized to applications in quantum memories based on Ytterbium-doped crystals. Tested for thermal, structural, and spectral robustness. Assembled circuitry for precise optical pumping and ensemble preparation.

Skills/Software: Optics, electronics, MATLAB, Mathematica

Characterizing the oblateness of the Milky Way's Outer Halo 06/16—08/16

California Institute of Technology, PMA Department

Prof. Judy Cohen

Synthesized population models of the Milky Way's Outer Halo to quantify its oblateness. Implemented routine for constructing ML-based Lomb-Scargle periodograms of RR Lyrae light curves.

Skills/Software: Python, time-series analysis

Complex networks and NoCs intern at teuscher.:Lab 06/13—06/15

Portland State University, ECE Department

Prof. Christof Teuscher

Developed an iterative model for developing networks-on-chip (NoCs) incorporating traffic throughput as a metric in the design process.

Skills/Software: MATLAB

Applied neural network analysis techniques (community and motif detection) to correlate structural aspects of complex NoCs with cost-efficiency. Refer to co-authored publication.

Skills/Software: MATLAB

PUBLICATIONS

Retrieving the C and O Abundances of HR 7672 AB: A Solar-type Primary Star with a Benchmark Brown Dwarf.

Wang, J., Kolecki, J., Ruffio, J.B., Wang, J., Mawet, D., Baker, A., Bartos, R., Blake, G., Bond, C., Calvin, B., Cetre, S., Delorme, J.R., Doppmann, G., Echeverri, D., Finnerty, L., Fitzgerald, M., Jovanovic, N., Liu, M., Lopez, R., Morris, E., **Pai Asnodkar, A.**, Pezzato, J., Ragland, S., Roy, A., Ruane, G., Sappey, B., Schofield, T., Skemer, A., Venenciano, T., Kent Wallace, J., Wallack, N., Wizinowich, P., and Xuan, J. (2022). *AJ*, 163(4), 189.

Variable and super-sonic winds in the atmosphere of an ultra-hot giant planet

Pai Asnodkar, A., Wang, J., Eastman, J., Cauley, P., Gaudi, B., Ilyin, I., and Strassmeier, K. (2022). *AJ*, 163(4), 155.

KELT-9 as an eclipsing double-lined spectroscopic binary: a unique and self-consistent solution to the system

Pai Asnodkar, A., Wang, J., Gaudi, B., Cauley, P., Eastman, J., Ilyin, I., Strassmeier, K., and Beatty, T. (2022). *AJ*, 163(2), 40.

A Structural Analysis of Evolved Complex Networks-on-Chip

Chung, H., **Pai Asnodkar, A.**, and Teuscher, C. (2012). In Proceedings of the Fifth International Workshop on Network on Chip Architectures (NoCArc '12). ACM, New York, NY, USA, 17-22. <http://doi.acm.org/10.1145/2401716.2401721>

AWARDS AND HONORS

NASA Space Technology Graduate Researcher (2022)

Recipient of NSTGRO fellowship for "Dual-Aperture Fiber Nulling For High Spatial and Spectral Resolution Studies of Exoplanets".

2021 Edward F. Hayes Research Forum (The Ohio State University)

Selected to present an oral presentation and awarded honorable mention in the category of Mathematical and Physical Sciences.

The David G. Price Fund-Research Associateship in Astronomical Instrumentation

Received fellowship twice from 2020-2022.

ORAL PRESENTATIONS

Variable and Super-sonic Winds in the Atmosphere of an Ultra-hot Jupiter

Bay Area Exoplanet Meeting, March 2022

Measuring Rapid Global-scale Winds on KELT-9 b

Emerging Researchers in Exoplanet Science (ERES) Conference, May 2021

Global-scale Winds and Dynamical Mass of the Ultra-hot Jupiter KELT-9 b

Invited, NASA Jet Propulsion Laboratory Exoplanet Journal Club, May 2021

Caltech SFP SURF Seminar Day

Caltech, 2016-2018

POSTER PRESENTATIONS

Variable and Super-sonic Winds in the Atmosphere of an Ultra-hot Jupiter

Exoplanets IV, Las Vegas, May 2022

An Iterative Model for Developing Traffic-Optimized Networks-on-Chip

Intel International Science and Engineering Fair (Intel ISEF), Los Angeles, May 2014.

WORKSHOPS AND SUMMER SCHOOLS

AstroTech Summer School

University of California, Berkeley, July 2021

Penn State Astrostatistics Summer School

Virtual, June 2021

Erdős Institute Data Science Boot Camp

Virtual, May 2020

Final group project selected within top 5.

High-Resolution Infrared Spectroscopy for Exoplanet Characterization Hackathon

Caltech, February 2020

2018 Southern California Conference for Undergraduate Women in Physics (CUWiP)

Jarvey Mudd College, Pomona College, and Cal Poly Pomona, January 2018

ZTF Summer School 2016

Caltech, June 2016

MENTORSHIP

The Ohio State University Polaris Program

08/20 —Present

Providing academic counseling and semester-long research project mentorship for undergraduates.

SciAccess Zenith Mentorship Program

09/20 —12/20

Provided college guidance and citizen science project mentorship for blind and visually-impaired high school students interested in space sciences.

OUTREACH

OSU Undergraduate Research Summer Access (URSA) Program

08/21

Organized program logistics and led cohort-building activities for a 2-week long early arrival program aimed at incoming OSU freshman in physics and astronomy.

The Ohio State University Astronomical Society

11/20

Presented in-prep. work on atmospheric dynamics of KELT-9 b.

Columbus Astronomical Society

04/20

Co-presented a historical overview of women in astronomy with cohort.

TECHNICAL STRENGTHS

Operating systems

Linux/Unix, Windows

Languages

Python, MATLAB, Mathematica, R, HTML, CSS

Astronomy Software

numpy/scipy/astropy, emcee, george, Spectroscopy Made Easy (SME), petitRADTRANS

Miscellaneous

Optics, LaTeX, GitHub